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THE ANIMALS OF INDIAN GARDENS.

Some Indian Friends and Acquaintances: a Study of the Ways of Birds and other Animals Frequenting Indian Streets and Gardens. By Lieut.-Colonel D. D. Cunningham, C.I.E., F.R.S. Pp. viii+423. (London: John Murray, 1903.) Price 12*s.* net.

BOOKS on the animals, birds especially, that abound in Indian gardens tend to become numerous. This is not surprising, for the wealth of animal life to be found in Indian cities, and especially in suburban gardens, far exceeds anything known in Europe. Not only is the fauna much richer, but, as Colonel Cunningham points out, all animals are tamer and are protected by the human inhabitants of the country, "who," as he says, "are free from the desire to capture or kill any strange or beautiful living thing that they may meet with, who have no youthful hereditary instinct for bird-nesting, and in mature life no natural appreciation of 'murder as a fine art.'"

Whether the last phrase is quite correctly applied to a race amongst whom Thugs and Dacoits flourished at no distant period in the past may perhaps be open to doubt, but there is no question that veneration for animal life is a living principle amongst Hindoos and Buddhists, and consequently that in but few countries in the world are wild birds and beasts more familiar than in India.

The richness of the vegetation in Indian gardens will in a few months, if not checked, convert any vacant space into a thicket, and the cover that is thus produced affords a great attraction to the wild animals of the neighbourhood. Calcutta, where most of Colonel Cunningham's notes were made, has a richer fauna and flora than Indian cities in general, and amongst its suburban gardens are the beautiful Botanic Gardens of Shibpur, which are unsurpassed in India, and the fauna of which has long been almost as famous as the flora.

Of the opportunities afforded by Calcutta suburban gardens for the observation of birds and other animals Colonel Cunningham has made admirable use, and his notes may be fairly compared with Aitken's well-known "Tribes on My Frontier" and "A Naturalist on the Prowl." So far as it has been possible to check the accounts in the present work, all the animals, birds, beasts, reptiles, batrachians and fishes are correctly identified, and the accounts of their habits are from actual observation, not, as is so frequently the case, from tales told by imaginative natives of the country. Only one instance has been met with in which Colonel Cunningham's experience is opposed to that of other writers. He says that tree-snakes, *Dryophis mycterizans,* are "decidedly ill-tempered animals and very ready to bite" (p. 338). The experience of the present writer is precisely the contrary, but there is probably some explanation of the difference.

It is true that many of the observations now recorded have been made by other writers and published in older works, but they are so interesting that they will bear repeating, and the liability of all observers to error in noting the habits of wild animals is so great that it is only by repeated observations that accuracy can be attained. Moreover, many of the facts noticed, even if they have been observed before, are not generally known. As an instance of such contributions to natural history the following account of the device adopted by a pair of "koils," the famous Indian fruit-cuckoos, when engaged in laying eggs in the nests of crows may be quoted. It is, of course, well known that the sexes in the koil differ much more than they do in the majority of cuckoos, the male being glossy black, the female speckled brown, and it is extraordinary that a bird of inferior intelligence and inferior pugnacity should succeed in foisting its eggs on a crow, its superior in both respects.

"The order of events is this: when everything is ready and a desirable nest has been chosen, the cock-koil, conspicuous in his shining black plumage and crimson eyes, seats himself on a prominent perch, whilst the hen, in modest speckled grey garb, lurks hidden amongst dense masses of neighbouring foliage. He then lifts up his voice and shouts aloud, his voice becoming more and more insistent with every repetition of his call, and very soon attracting the attention of the owners of the nest, who rush out to the attack and chase him away. Now comes the chance for his wife, who forthwith nips in to deposit her egg. Very often she does this successfully before the crows have returned, but every now and then she is caught in the act, and driven off, like her husband, uttering volleys of shrill outcries."

Many of the notes on snakes are interesting, and as in this case even the "snake-stories" may be believed, one may be quoted.

"When there was much demand for stores of dried venom for European laboratories, the old snake-man in the Zoological Garden at Alipur was sent out every autumn to collect as many snakes as possible for use during the ensuing winter. His excursions generally lasted for a week or two, and then he would return laden with sacks full of snakes. Once he came back in great triumph bringing a hundred and fifty cobras, and it was a gruesome sight to watch him loose the mouth of one of his sacks and plunge his arm down into it in order to haul out one after another of his prisoners. . . . The cobras were so crowded and hampered in their confined quarters as to be quite unable to raise their heads and necks for the downward stroke with which they normally lay hold, and the man knew so well where and how to seize them, that the chance of his being bitten was really very small."

It is to be regretted that the plates in this book are by no means so good as the text. Some afford a fair idea of the birds or other animals represented, though even in this case, as in the two coloured views of adjutants by day and at roost, the figures are sometimes caricatures, and the majority appear to be copies of indifferent Indian native drawings. Colonel Cunningham is too good an observer not to be aware that neither the colour nor the relative position of the head, wings, and body during flight of the Indian swifts represented in Plate xiv. is correct, that the ants on Plate vi. (p. 112) should not be shown as larger than the eggs of the blue-throated barbet, and that the crow in the front of the plate opposite p. 60 ought to

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have the head and neck grey and not black like the "corbies" in the background. There is evidently some error about these figures, for they are referred to throughout the book as Plates i., ii., &c., whilst the corresponding numbers are only marked on them exceptionally and sporadically.

But although the illustrations are not so good as could be wished—and all who have had experience in similar matters know how very difficult it is to secure good figures of animals—the perusal of the present book may be recommended to all who are interested in the animal life of India. W. T. B.

ENGINEERING SCIENCE.

Strength and Elasticity of Structural Members. By R. J. Woods, M.Inst.C.E. Pp. xi+310. (London: E. Arnold, 1903.) Price 10*s.* 6*d.* net.

DURING the last fifteen years there has been a rapid growth in the number of engineering students taking a full course at one or other of the many institutions in Great Britain and America which offer instruction in the necessary subjects, and as a result there has been a steady stream of text-books written especially for this comparatively new class of college students. The strength and elasticity of materials is a branch of engineering science which must be thoroughly mastered by every student, no matter to what branch of engineering he eventually proposes to devote himself. It is not surprising, therefore, that a number of text-books devoted to this subject have been published during the past few years, and it is hence a somewhat difficult matter for any author to show much originality in his treatment of the problems which have to be solved. Mr. Woods has, however, been able to deal with several points in a fresh and interesting manner. The book will be especially valuable to the private student on account of the very excellent series of examples at the end of each chapter, with the solutions given in every case.

The first chapter is devoted to graphical statics, and after simple definitions of the triangle and polygon of forces, the funicular polygon, and the graphical conditions of equilibrium, the methods of solution are explained, and then applied to the practical problems of the graphical determination of stresses in roofs, girders, and framed structures. In the next three chapters the relations between stress and strain are very fully and carefully discussed, the properties of the ellipse of stress are deduced, and the results are applied to the determination of the principal stresses in a beam. In a text-book of this nature it is very important that complete tables should be given of the weights, strengths, and other properties of the various materials used by engineers in structural work, and it may be well to point out that the tables given on pp. 72 and 73 might have been considerably increased, and certainly would have been improved, by the addition of a column giving the elastic limit in tension for such materials as wrought iron, mild steel, &c.

In dealing with bending and bending moments, a slight inversion of the actual order adopted would probably have facilitated the reading of the private student, that is to say, in chapter v. it would have been better to have placed the formulæ connecting stress and bending moment at the end rather than at the beginning, after all the preliminary work of determination of bending moment, drawing of shear and bending moment diagrams, &c., had been fully treated. The author has introduced into the chapters dealing with beams the graphical methods for finding the equivalent area or modulus of section of beams; this useful piece of work is too often omitted from the ordinary text-books.

As the book was originally written in the form of a series of lectures for students at the Royal Indian Engineering College, it naturally deals with one or two branches of the subject not usually considered in elementary text-books; for example, stresses at the joints in masonry structures, stresses due to earth pressure at the back of retaining walls, and the strength and design of riveted joints for structural work, are all fully discussed. The book is a good, clearly written text-book, and will probably be a useful work of reference not only to the engineering student, but to those engaged in actual practical work.

T. H. B.

SCHOOL GEOMETRY.

Theoretical Geometry for Beginners. Part iii. By C. H. Allcock. Pp. viii+113. (London: Macmillan and Co., Ltd., 1904.) Price 1*s.* 6*d.*

Elementary Geometry. Section iii. By Frank R. Barrell, M.A., B.Sc. Pp. viii + 285 to 360. (London: Longmans, Green and Co., 1904.) Price 1*s.* 6*d.*

Rudiments of Geometry for Junior Classes. By M. Wilson. Pp. 228. (London: W. R. Russell and Co.) Price 1*s.* net.

Geometry on Modern Lines. For Elementary Students. By E. Springfield Boulton, M.A. Pp. viii+126. (London: Methuen and Co., 1904.) Price 2*s.*

THE text-book by Mr. Allcock, of which part iii. is now issued, is an excellent substitute for Euclid for those teachers who wish to confine attention mainly to deductive geometry. Experimental and practical work is not entirely omitted, but it occupies a very subordinate place. The book is very attractive on account of its admirable and incisive style and the beautifully clear manner in which it is got up and printed, and it cannot fail to give satisfaction wherever adopted. The present part includes the more important propositions of Euclid, Book ii., also Book iii., Props. 35–37, and Book iv., Props. 10–16. In many cases the algebraical equivalents follow the geometrical proofs, and mutually illustrate one another. In some of the propositions it would have been a great advantage if simple trigonometrical equivalents could also have been given. A useful chapter on the radical axis is included, and answers to the numerical examples are collected at the end of the book.

The geometry by Mr. Barrell displays very commendable originality in the manner of presentation.

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